

Automated Fault Diagnostics, Prognostics, and Recovery in Spacecraft Power Systems, Phase I

Completed Technology Project (2007 - 2007)



Project Introduction

Constellation Program, the next frontier of NASA's space exploration plan, targets for manned mission to Moon and Mars. The missions under this program will be of long-duration and far more critical than any previous manned mission. Integrated Systems Health Management (ISHM), which includes fault detection, diagnosis, and prognosis, has been recognized as one of the critical processes that will enhance system functionality, mission success probability and crew safety for these missions. In addition, ISHM should support in deciding reactionary actions in response to a system failure or a failure precursor, i.e., the system recovery functions. Spacecrafts for the constellation program requires a significant degree of autonomy that includes the ability to monitor their own health and perform mission objectives in the wake of unexpected events (faults, failures, etc). In response to the needs stated in the solicitation topic x2.01, Qualtech Systems, Inc. (QSI) proposes to develop novel diagnostic, prognostic, degradation analysis and automated recovery techniques for spacecraft power systems. The proposed effort will use reactive mission planner technologies for formulating recovery options and mission re-planning to accommodate for degradation in power systems. Inclusion of the resulting technologies will streamline cost of long-duration space missions and enhance the mission success probabilities.

Anticipated Benefits

Potential NASA Commercial Applications: Aviation industry (and operators), commercial communication satellite manufacturers and operators, automotive industries and cruise ship operators are the potential non-NASA civil sectors who will be interested in this technology. Fault diagnosis, prognosis, degradation analysis and automated recovery are of special importance to these sectors. In addition, all these industries are interested to employ reactive mission planning into their manufacturing and/or service operations. DoD, Navy, Airforce, and MDA are the potential military customers of the resulting technology. These agencies will be specifically interested into the automated reactive mission planning process.



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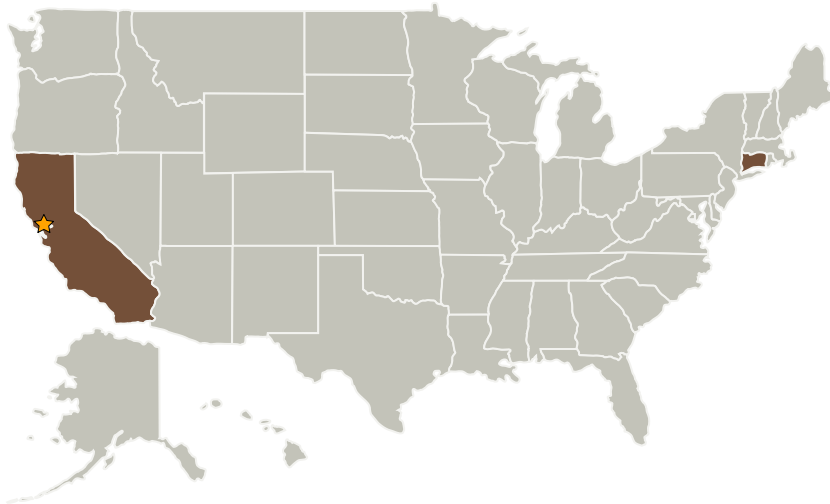
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Qualtech Systems, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Rocky Hill, Connecticut

Primary U.S. Work Locations	
California	Connecticut

Project Transitions

 **January 2007:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Sudipto Ghoshal

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.5 Fault Diagnosis and Prognosis

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July 2007: Closed out

Closeout Summary: Automated Fault Diagnostics, Prognostics, and Recovery in Spacecraft Power Systems, Phase I Project Image